AQA

AS
MATHEMATICS

MPC2 Pure Core 2
Report on the Examination

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General

The vast majority of students seemed to have sufficient time to tackle the paper and marks were obtained throughout the range of topics.

Question 1

This question which tested perimeter and area of a sector was answered correctly by the vast majority of students. The most common error in part (a) was to equate the formula for the arc length to the length of the perimeter, which gave 2.75 for the value of theta. Such students may have reconsidered their solution if they had realised that 2.75 radians is an obtuse angle.

Question 2

A large majority of the students scored full marks for part (a) of this question which tested use of the sine rule. A small minority of students lost the final mark because they did not show a more accurate value before stating $C = 19°$, to the nearest degree. A high proportion of students scored full marks for finding the area of the triangle in part (b). A common incorrect method involved the use of $\frac{1}{2}(6)(16)\sin 19°$. Some students, even though they found $B = 41°$, went on to use the cosine rule to obtain $AC = 12.1$ and then used $\frac{1}{2}(AC)(16)\sin 19°$. Inappropriate rounding sometimes led to the loss of the final mark using this method.

Question 3

This question which tested the use of the laws of indices was the least well answered of the nine questions. A common error in part (a) was to write $\sqrt{27^x}$ as $3\sqrt{3^x} = 3^{1+0.5x}$. A significant minority of students who correctly expressed $\sqrt{27^x}$ as $3^{1.5x}$ neglected to use brackets appropriately and gave their answer as $3^{1.5x-2x-1}$. Such students were awarded two of the three marks in part (a).
In part (b) students generally scored the mark for using laws of indices or laws of logarithms to deal with $\sqrt[3]{81}$, but only a small proportion of students were awarded both marks.

Question 4

As expected, most students scored full marks in part (a). The most common wrong answers were 162 and 108 respectively. In part (b) the vast majority of students used the correct formula for the sum to infinity but some who had the correct answers in part (a) chose to use $a = 162$ and so lost at least two of the marks. Those who had 162 as their value for u_1 in part (a) could score two of the three marks in part (b). Most students did use the correct exact value for the common ratio, but it was disappointing to see a minority of students using $r = 1.5$ in the formula for the sum to infinity.
Part (c) was the least well answered part question on the paper with only a very small proportion of students scoring full marks. The most common errors in setting up the inequality were either to use $u_n < 2.5$ or to write $S_\infty - S_k < 2.5$. A majority of those students who started with the correct inequality were unable to manipulate the expressions correctly. A common error was to write $108 \times \left(\frac{2}{3}\right)^{k-1} = 72^{k-1}$.

Question 5

In part **(a)**, the vast majority of students correctly equated the expression for $\frac{\mathrm{d}y}{\mathrm{d}x}$ to zero. Solving $x^{\frac{3}{2}} - 2x = 0$, students generally correctly stated $x^{\frac{1}{2}} = 2$ but this sometimes was followed by the incorrect value $x = \sqrt{2}$. Students who gave their answer as $x = 0$, $x = 4$ did not score the final mark. In part (b), a very high proportion of students gave the correct expression for the second derivative for two marks. Use of an incorrect value for x or failure to fully justify the minimum point resulted in a significant minority losing the final mark. The majority of students realised that integration was required to obtain the equation of the curve in part **(c)**. Integration was usually carried out correctly for two marks. Failure to include a constant of integration or substitution of $x = 0$ instead of $x = 4$ resulted in only a minority of students scoring any further marks.

Question 6

Part (a)(i) tested the use of the trapezium rule, with a high proportion of students scoring full marks. Other than arithmetical errors, the most common error was a lack of brackets in the formula. Very few students failed to give their answer to the required two decimal places. The vast majority of students scored the mark in part (a)(ii). Slightly more than half the students failed to score any marks in part (a)(iii), with many just writing down their answer to part (a)(i), or just stating that $k = 8$. The most successful students drew the relevant rectangle on the given diagram and linked it with their answer to part (a)(i) to find the required value. In part (b)(i) it was pleasing to see that almost all students gave their answer as a column vector. The most common wrong answer was $\begin{bmatrix} 4 \\ 0 \end{bmatrix}$ from students who did not appreciate that $\mathrm{f}(3x)$ was mapping to $\mathrm{f}\left(3\left(x - \frac{4}{3}\right)\right)$. Part **(b)(ii)** was poorly answered with many stating that the stretch was in the x-direction, or claiming that there was no stretch. Part (c) was well answered with many scoring both marks. Again lack of brackets, as illustrated by $3x - 4\log 2 = \log 7$, was a concern, but recovery was allowed if a later line of working showed a rearrangement that was valid.

Question 7

The majority of students gave a fully correct solution to part (a). The most common error was an incorrect integration of the term $\frac{1}{x^2}$. Some students applied the trapezium rule and then claimed that the area was 16, for which the maximum possible mark was one. Part (b) was less well answered with only a minority scoring at least half marks. Most students correctly stated that the gradient of the given line was -4 although the incorrect $-4x$ was seen. A common method error was to equate the derivative to -4 instead of $\frac{1}{4}$. Approximately 70% of those students who set up the correct equation, went on to find the correct equation of the normal.

Question 8

The vast majority of students in part (a) gave the correct value 48 but a significant minority failed to score the second mark either for not rounding to the required accuracy or stating the wrong value

318. In part (b)(i) most students recalled the correct trigonometric identities, but poor manipulation, thetas missing and a lack of brackets led to the loss of marks. In part (b)(ii), students who introduced new notation (for example, x used for $\cos\theta$) did not always state what the notation was referring to. In general, the factorisation was correct but the explanation for why $\cos\theta \neq -2$ was frequently imprecise or wrong. The common wrong reason was '$\cos\theta$ cannot be negative'. A significant minority of students did not see the link between the equation given in part (c) and the equation given at the start of part (b)(i). Those students who correctly stated that $\cos 4x = \frac{2}{3}$ usually solved this equation to find at least two correct solutions, but a common error was to exclude the case $4x = 672$. A small minority of students did not give their final values for x to the nearest degree.

Question 9

The majority of students applied laws of logarithms correctly with $3\log_2(c+2) = \log_2(c+2)^3$ earning the first mark followed by $\log_2\left[\frac{(c+2)^3}{\frac{c^3}{2}+k}\right] = 1$. The most common method error at this point was $\frac{\log_2(c+2)^3}{\log_2\left(\frac{c^3}{2}+k\right)} = 1$. Students who scored the first two method marks usually eliminated the logarithms correctly. Most students who attempted the expansion of $(c+2)^3$ usually scored at least one of the two marks. Identifying the work required for the final accuracy mark, as expected, proved to be demanding although excellent solutions were seen for full marks.

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account on how students have performed for each question.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

Converting Marks into UMS marks

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.
UMS conversion calculator